# Test Report Set Operations

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Time spent: 6 hours

The task was to test the three implemented set operations intersection, union and difference.

At first, we created manual tests, for which we defined two sets in the code:

t1 = insertSet 10 (insertSet 8 (insertSet 6 emptySet))

t2 = insertSet 11 (insertSet 9 (insertSet 6 emptySet))

t3 = insertSet 11 (insertSet 9 (insertSet 7 emptySet))

Then we made sure that the three set functions would have the expected results:

* The intersection of t1 and t3 must be empty
* The intersection of t1 and t2 must contain 6
* The union of t1 and t3 must contain 10
* The union of t1 and t2 must contain 6
* The difference of t1 and t2 must contain 10
* The difference of t1 and t2 must not contain 6

After writing the first manual test it became more obvious how to create automatic tests, and with help of the generator we created in Task 2, we were also able to implemented automated tests for all three set operations.

We created simple recursive checks that could be applied to ensure that the functions are working correctly. The constraints that we test for are shown below:

**Union**

Domain: Given are set A, set B and the union of A and B is called C

Constraint: Every element in A must exist in C and every element in B must exist in C

**Intersection**

Domain: Given are set A, set B and the intersection of A and B is called C

Constraint: Every element from A that exists in B must exist in C

**Difference**

Domain: Given are set A, set B and the difference of A and B is called C

Constraint: Every element from C must exist in A or B but not in both

To reduce the risk of a positive test result that comes from coincidence, we let the automated tests run 100.000 times, which takes about a minute of calculation time.